Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter	)	
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Improving Public Safety Communications in the 800 MHz Band	)	
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Consolidating the 900 MHz Industrial/Land Transportation and Business Pool Channels	)	WT Docket No. 02-55
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COMMENTS OF THE CITY OF PORTLAND, OREGON

The City of Portland, Oregon ("Portland") submits these Comments in response to the Commission's Notice of Proposed Rule Making ("NPRM") in the above-captioned proceeding.

Statement of Interest

Portland has operated an 800 MHz voice network for approximately eight (8) years. Portland's 800 MHz voice network, which is primarily used for police dispatch and radio communications, consists of the following:

- 17- 800 MHz analog conventional voice and data channels
- 79- 800 MHz trunked channels, consisting of 151 base stations, 14 sites and 41 5-port combiners used with Motorola's SmartZone equipment.
- 10,500 mobile and portable full-time and mutual-aid two-way devices. These devices are primarily Motorola MTS2000 portables and Motorola Spectra mobile radios.

The voice system was designed to provide balanced talk-in and talk-out capability so transmitted effective radiated powers ("ERP") were limited. However, due to pervasive interference problems it has been experiencing, Portland has incurred approximately $500,000 dollars in remedial expenses to optimize the transmitted output power to help mitigate the interference.

Portland also operates a mobile data network, consisting of an 800 MHz conventional system operating a 19.2 Kbps RD-LAP MFR protocol with approximately 730 mobile data devices. This system was designed as a low-power (3-watt) system to more efficiently use the spectrum.

This low-power system, for which transmitted power levels can only be slightly increased, is severely impacted by interference from Nextel and other commercial mobile radio service ("CMRS") providers operating in the Portland metropolitan area. As a result, Portland has an interest in the outcome of this proceeding.

Historical Background

Portland's first indication of interference came from Nextel Communications (Nextel) during the summer of 1998. Intermittent portable radio and MDT "dead spot and out-of-range" complaints from police officers in downtown and suburban areas around the city of Portland were received by the Portland COM-NET.[1] Portland complained to Motorola about the receiver performance of the MTS portable radios when near an iDEN site. About the same time, Portland received information from a Motorola Trunked User Group (MTUG) contact who mentioned a March 16, 1996 Florida Highway Patrol interference and out-of-range complaint that sounded

[1] COM-NET is a city department responsible for the engineering and maintenance of the radio communications systems.

much like Portland's complaint. Motorola provided Portland with a March 12, 1997 memorandum outlining the Florida Highway Patrol complaint of cellular interference to NPSPAC channels. This memorandum helped confirm that Nextel operations were the likely source of interference to Portland's 800 MHz NPSPAC operations. Complaint calls into Nextel were basically unanswered until an article by Joe Kuran, which highlighted the Nextel interference problem in nearby Washington County, Oregon, appeared in the March 1999 edition of *MRT*.

In June 1999, Portland objected to the construction of a Nextel iDEN site at the Portland International Airport ("PDX") because of potential interference to the Portland radio system. Airport police are among the users of the Portland radio system[2]. Portland's intervention in Nextel's site lease negotiations appears to have caused Nextel to take Portland's harmful interference complaints more seriously. However, from the first June 1999 meetings, it was clear that Nextel did not want to share any iDEN infrastructure information and site deployment locations, which would be invaluable for interference resolution. Finally, on July 27, 1999, Portland signed a confidentiality agreement with Nextel that allowed access to Nextel's infrastructure information, site deployment locations and channel assignments beyond the PDX site. From this information, the extent of Nextel's system was determined. This new information allowed Portland to match police officer complaint locations with the Nextel iDEN sites. This information also started a chain of events that led Nextel into making some iDEN network changes to help Portland mitigate the harmful interference.

[2]In addition to Portland Police, Fire and 9-1-1 personnel, Portland's 800 MHz radio and mobile data system serves more than 100 public safety and first response entities in its coverage area.

A Letter of Understanding agreement was drafted by Portland in July 1999 to help facilitate interference mitigation at the PDX site and allow Portland the ability to turn off the Nextel PDX iDEN site should certain conditions arise. Nextel moved slowly on approval of this letter, but it was finally signed on December 7, 2000.

Various local and national newspaper articles brought attention to the Portland/Nextel interference issues. The media attention heightened officer awareness of the interference problems, which strained the relationship between Portland and Nextel. Indeed, the Portland Police Bureau filed an Occupational Health and Safety Act (OHSA) "officer safety" radio complaint against the City of Portland claiming unsafe working conditions created from the interference problems, radio coverage and some other dispatch/system related issues. A bill was introduced in the Oregon State legislature in 2000, which would have allowed civil courts in Oregon to award damages to individual citizens as a result of loss of life or property caused by an interfering carrier to a public safety receiver. This legislation prompted public hearings on the interference issue and caused Nextel executives to appear in Oregon to present public testimony. At that time, Nextel announced its intention to work collaboratively with Oregon public safety agencies to actively mitigate "all interference caused by Nextel" in the region.

Over the next year, Nextel made minor iDEN site channel and ERP changes to assist Portland whenever a complaint was received. Nextel would solve an interference problem in one area of the city only to have a new one appear somewhere else in the region. The 800 MHz interference problems on the Motorola MTS portables and mobile data RF modems continued due to Nextel's rapid site and capacity growth. The result was a "patchwork" of coverage problems over Portland's radio service area.

On March 2, 2001, Portland received ten "specially made" MTS radio frequency (RF) boards from Motorola. These new RF boards were designed to help Motorola improve the MTS receiver performance in high Nextel RF areas.[3]

On July 6, 2001, after extensive field testing, Portland released a MTS receiver performance field modification that requires only a single component replacement in MTS receiver AGC circuit. This modification greatly improves the performance of the MTS receiver in high RF areas. The cost of this modification is less than a dime per unit for parts. Though Portland urged Motorola to adopt this modification nationwide, Motorola instead adopted an alternate modification which proved much less effective and more expensive in Portland's tests.

On August 30, 2001, Nextel turned on its PDX iDEN site with the understanding with Portland that it: (1) did not use frequencies with channel suffixes which match the 800 MHz channel suffixes used on the Portland simulcast system, and (2) lowered its sites ERP to five (5) watts. Nextel engineers had identified the source intermodulation interference lay in the joint use of like-suffex channel sets in the same coverage area. The 800 MHz suffix matching plan greatly reduced the 3rd and 5th order intermodulation in Portland's MTS receivers. Portland saw an immediate 75% improvement in Nextel interference rejection.[4]

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[3]Motorola SRN1347, September 2001 recommends two sets of modifications depending on the version of circuit boards in the MTS2000 portable radios.

[4]The channel suffix plan is a plan where Nextel uses frequencies with different suffixes (i.e., the .6875 portion of 856.6875 or the numbers to the right of the decimal place). The approach moves the intermodulation products off of the public safety frequencies.

The successful 800 MHz channel suffix coordination tests virtually eliminated the intermodulation on Portland's public safety channels at the PDX site. Portland asked Nextel to take a regional approach of solving the interference problem by changing their channel assignments at all of their iDEN sites within the primary coverage areas of Portland and the other 800 MHz public safety systems around Portland.

On September 8, 2001, Nextel retuned approximately 160 iDEN sites with the "public safety friendly" intermodulation free channel sets. This major spectrum management change resolved nearly 90% of the interference complaints overnight. It also greatly improved the working relationship with Nextel.

After the September 8, 2001 Nextel retuning, Portland started systematically modifying all MTS 2000 portable radios. Between the Nextel 800 MHz channel suffix matching retune and the Portland MTS receiver modifications, Portland was able to nearly eliminate all Nextel caused MTS radio interference problems in their primary coverage areas.

Unfortunately, this relief is temporary. Problems have recently reappeared because Nextel has been activating "public safety un-friendly" channel sets at previously intermodulation-free iDEN sites. Nextel is running out of channels that can be used without causing interference and the local Nextel engineers appear to have made changes to their network. Nextel's actions have caused a renewed round of interference, making it clear that previously successful efforts to resolve interference are short-lived. The interference cannot be eliminated permanently while both Nextel and public safety are licensed in the same spectrum using current technology.

Currently, a majority of the Nextel interference complaints are from mobile data users. The 800 MHz RF modems used on the Motorola 19.2 KB RD-LAP network will not tolerate

high RF from multiple transmitter sites anywhere in the 800 MHz band. The receiver selectivity and intermodulation performance is poor at best. Motorola, the equipment vendor, has offered no assistance in helping Portland develop a technical solution.

Comments on Specific Issues In the NRPM

Portland generally concurs with the basic approach and comments submitted by the Association of Public Safety Communication Officials International ("APCO") in this proceeding. However, Portland would like to make the following additional comments:

1. Portland views much of the "anti-Nextel" rhetoric as counterproductive as the fundamental problem is related to past regulatory actions[5] with respect to the current spectrum allocation and system design decisions[6] made by both the public safety community and the CMRS system operators. Portland believes it has demonstrated the parties involved can work cooperatively to resolve many of the interference problems in the short-term. This means the CMRS operators will likely not be able to implement all of the channels they desire because of interference in a

[5] The original FCC decision to allow the digital cellular type approach on such a wide scale. *See, Amendment of Part 90 of the Commission's Rules to Facilitate Future Development of SMR Systems in the 800 MHz Frequency Band*, PR Docket No. 93-144, First Report and Order, Eighth Report and Order, and Second Notice of Proposed Rule Making, 11 FCC Rcd 1463 (1995).

[6] Public safety systems have generally been designed to be "noise limited" meaning the limit of the ability for a field unit to operate is determined by the noise floor of the receiving device. Commercial cellular-type CMRS systems in urban areas are generally "interference limited" because frequencies are reused in the same area a field unit's receiver may hear multiple carriers on the same frequency with the strongest signal being properly received. This results in a much different "average" signal level being presented to the field units. This wide difference results in receiver generated intermodulation which interferes with the weaker on-channel signals supplied by the public safety system. Many urban public safety systems operate with minimum desired signal levels of -95 to -105 dBm. Many of the cellular type CMRS systems have average signal levels 40 dB or more higher.

particular area to public safety users. The FCC should require "voluntary" participation by all the CMRS providers involved in working out compromise solutions to the interference problems. A regional frequency coordination approach similar to that developed for the NPSPAC frequencies may be required between public safety and commercial frequencies while commercial providers have interfering spectrum assignments. At this time, the CMRS operators and in some cases the "A" band cellular carriers may need to change frequencies or reduce power and public safety may need to modify their radio units to improve intermodulation performance.

2. Portland views the approaches outlined in the NPRM (i.e., the Nextel and NAM proposals) as mid-term solutions. The initial solution is for the CMRS providers to recognize the role they play in this problem and that their involvement and cooperation are necessary components of the solution. The mid-term solution may be to modify the 800 MHz band allotments to increase frequency separation between the public safety licensees and cellular-like CMRS systems and the cellular "A" band. However, the following issues need to be considered:

a. Moving all of public safety systems into a narrower band will create intra- and inter-system frequency coordination problems. Many large public safety systems use spectrum efficient "simulcast" technology[7] where they use a smaller number of channels to cover a large area. While this reduces the total number of channels required to cover a large area, it also reduces the flexibility in choosing channels.

[7] Simulcast technology uses special engineering and technical systems to allow multiple transmitters on the same frequency to operate in a coordinated fashion. This allows a single set of frequencies to be used over a large geographic area without resorting to sites with large heights above average terrain. In many cases, this also allows lower individual site ERPs to be used because multiple sites are used to provide the coverage.

b. Most of the existing frequencies in any given area, certainly in any major urban area, are already used. The frequency shifting process would require some "green" spectrum space so one of the systems could move and vacate frequencies to allow the other system to operate on those vacated frequencies. Virtually all of the public safety systems use fixed tuned equipment that would need to be re-programmed manually. This includes not only the RF infrastructure but also the controllers in many cases. This process is not affordable through conventional funding mechanisms available to local government, such as bond measures. It could involve much time, effort and resources to make the change, and would require complicated coordination. One approach would be to use the same band plan approach used in the 821/866 and 824/869 MHz "NPSPAC" to generate additional frequencies.[8] If the technical and coordination issues can be resolved, this may create the additional channels needed in some areas.

c. The band re-alignment approach would <u>not resolve</u> the interference problems currently being experienced by the Portland mobile data system.

[8] This approach has several technical issues associated with it. The NPSPAC frequencies are spaced every 12.5 kHz but essentially use 25 kHz wide channels. This is accomplished by using a maximum deviation of ± 4 kHz instead of the ± 5 kHz used on the "806" channels. The RF infrastructure equipment could be re-aligned for the narrower deviation and the controller channel designations would need to be mapped to the new channels. This would require reprogramming every subscriber units which would be a significant task and would result in transition issues and planning as well.

d. The planning and implementation of the refarming approach is expected to be very expensive. An estimated cost is not available due to the short time frame allowed for this response, but given the cost of simply replacing antennas previously discussed, the cost to retune and reprogram the Portland system could easily be more than $1,000,000 dollars.

e. A band realignment must include a standard set of interoperability channels similar to the national calling and working channels defined for the NPSPAC frequency band.

f. Portland believes a long-term "zero tolerance" interference solution may require moving public safety to a "public safety only" frequency band further separated from the existing frequencies. Portland understands this may require legislative action.

3. Portland believes some type of federal funding method needs to be developed to assist state and local governments in making both frequency changes and re-design or redeployment of more efficient technologies. The Portland system was originally funded from local tax dollars and general debt. It has seven more years of debt payments on the current system which was designed and deployed prior to the deployment of the "Nextel" type systems in the same band. Funding any major re-tuning or significant system change would virtually eliminate Portland's financial ability to replace the system when it reaches its end of life.

4. Portland suggests equipment manufacturers must do a far better job in addressing the interference issue. For instance manufacturers have contended that building a receiver with improved intermodulation performance would result in unacceptable battery life (i.e., it would be too large, etc.). However, these options have not been presented to Portland for consideration, nor has Portland ever been asked if it would sacrifice size or battery life for improved receiver performance. In fact, recently released radio models have similar receiver specifications to the existing models even though the equipment vendor has been aware of receiver performance issues for over eight years. Generally, equipment with the highest receiver specifications is coupled to expensive equipment options and special features which have nothing to do with the receiver performance. Thus, in general, the public safety community is forced to increase their expense per unit buying expensive features they neither want nor need or sacrifice performance. Often receiver performance can be improved with only a few additional cents or dollars in parts as Portland has proven in its program of self-modification of its receivers. It appears manufacturers are attempting to force receiver replacement and upgrade at the highest premium rather than improving performance in the line of equipment most often purchased by public safety. Some minimum equipment performance standards may need to be developed. Portland recommends that the FCC sponsor an independent study to determine if receiver performance could be improved for a small or moderate cost in either dollars or other performance specifications.

5. Portland recommends a case study be performed to determine what would be involved in re-tuning a major system the size of Portland's or larger. This study should review issues not only

with the system infrastructure but also with the process of making the transition and should include the issues with the commercial operators as well.

6. Portland urges the FCC to move quickly on this issue but not with undue haste because of the technical complexity of the issues. Portland has been dealing with these interference problems for six years with some success in reducing them. However, it takes constant vigilance and effort. At anytime, the addition of a Nextel site permanent or temporary, could result in a large area of poor or no coverage radio coverage. This could occur during a presidential visit, large sporting event, or natural disaster with devastating results. Portland's public safety responders deserve better.

Conclusion

The issues facing public safety 800 MHz system operators, CMRS operators, and the FCC are daunting with no clear cut solution. Initial steps for resolution are:

- The FCC must send a clear message that this situation is a significant public safety issue and all parties, commercial and public safety, must work together cooperatively to provide the maximum immediate reduction in interference. The message should be clear that this is not simply a "Nextel" problem.

- Some type of 800 MHz frequency band realignment is needed, but significant technical and cost issues exist.

- Equipment available to public safety system operators must be improved. Portland urges the FCC to have an independent study done on how receiver performance could be improved to avoid manufacturer intransigence.

- Frequency "green space" should be provided to facilitate any band realignment. This green space could be actual spectrum or additional channels created using technological methods.

- Portland currently does not have the funding to make a large system change. Any proposed band realignment should be accompanied by a funding plan.

- The long-term "zero tolerance" interference solution may involve a dedicated public safety frequency band with sufficient guard bands to provide adequate interference protection. This may require legislative action.

Portland respectfully requests that the Commission proceed in this rule making in a manner consistent with the views expressed herein.

Respectfully submitted,

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May 6, 2002